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Education in the Knowledge-based Society – Chosen Aspects

Abstract

The work deals with the contemporary sociological, psychological and pedagogical problems of the knowledge-based society. Special attention has been paid to the role of education in the new type of society, construction of knowledge, shaping of main job skills and abilities, semi-learning activity of individuals in lifelong learning process in public and private sectors of education during formal and informal education.

Key words: *knowledge-based society, education, main job skills, abilities, lifelong learning, semi-learning.*

Introduction

In the 21st century society has turned into one where knowledge and information are the core elements in competitiveness for both individuals and nations, as well as serve as the sources for creating value. Thus, human beings are called on to prepare for new paradigms in every field including politics, society, economy, culture, and education. In Poland the situation is very difficult because after 1989 our government made an attempt at reconstruction of the social, political, cultural and economical systems, neglecting the role of public education. This caused a crisis of educational praxis and as a result we have complicated, variable and ambiguous educational reality. The goal of the work is characterization of the knowledge-based society and the role of education in it.

Outline of knowledge-based society

The term, "knowledge-based" society, appeared for the first time in the mid-1960s when heated discussions were held regarding controversies over the fashions that would come after the industrial society.

In 1994 Peter Drucker popularized a futuristic vision of a new "knowledge society" which was to alter the nature of work, higher education, and the way society functions as a complex interdependent system. Drucker stated that "After the end of the 20th century knowledge workers will make up a third or more of the work force in the United States – as large a portion as manufacturing workers ever made up. Except in wartime. America's shift from an "industrial based" society to a "knowledge based" society means that workers will need further formal education in order to compete for a limited number of jobs and to succeed in the marketplace". The new jobs "will require a good deal of formal education and the ability to acquire and to apply theoretical and analytical knowledge". The educated person of the future will be one who has the capacity to continually learn new concepts and modes of operation through his or her life. The knowledge to be acquired will be practical in nature and specialized in scope.

In I.H. Dunlap's opinion (1995) an individual in the knowledge-based society should possess not narrow, specialized but a general knowledge, since in the new society there will be a place for a generalist and for institutions that can play the role of a generalist. Specialists need generalists who can point them toward new ideas in other fields. They also need institutions which provide information about these varied fields and which can bring all that knowledge together in a unified way. Libraries and librarians are uniquely qualified to perform these functions.

Daniel Bell wrote that post-industrial society was knowledge-based society[1], however, this did not have much repercussion at that time. Only of late, the modern society has gradually emphasized knowledge and its function. Nico Stehr suggested a theory on a knowledge-based society where it is emphasized that knowledge functions as a new production element replacing labour and capital as "classical" production elements.

At the World Science Forum in Budapest on 8-10 November 2003 in the session summaries one can find a definition of this new type of society: "A knowledge-based society is an innovative and life-long learning society, which possesses a community of scholars, researchers, engineers, technicians, research networks, and firms engaged

[1] At the end of the 20th century in the sociological literature there also existed other terms characterizing the new type of society, such as: information society, media society or society of knowledge, information and communication.

in research and in production of high-technology goods and service provision. It forms a national innovation-production system, which is integrated into international networks of knowledge production, diffusion, utilization, and protection. Its communication and information technological (ICT) tools make vast amounts of human knowledge easily accessible. Knowledge is used to empower and enrich people culturally and materially, and to build a sustainable society."

Annan (1997, p. 1) emphasized the important role of ICTs in the development of the new type of society: "Recent developments in the fields of communications and information technology are indeed revolutionary in nature. Information and knowledge are expanding in quality and accessibility. In many fields future decision-makers will be presented with unprecedented new tools for development. In such fields as agriculture, health, education, human resources and environmental management, or transport and business development, the consequences really could be revolutionary. Communications and information technology have enormous potential, especially for developing countries, and in furthering sustainable development." Thus, one can say that ICTs play a key role as a catalyst for creativity, stimulating innovation in all fields of art and social relations. Ensuring sustainable cultural development, freedom of expression and information, pluralism, protection of minors and consumers, in a competitive and dynamic knowledge-based economy will thus be crucial to maintaining quality of life and social cohesion, given likely changes due to people's mobility and the dynamics of intercultural dialogue.

The scientists who took part in the World Science Forum in Budapest (2003) characterized the differences that the knowledge-based society can make. In the new type of society:

1. all forms of knowledge (scientific, tacit, vernacular, embedded; practical or theoretical, multisensorial or textual, linearly/hierarchically organized or organized in network structures) are communicated in new ways;
2. as the use and misuse of knowledge has a greater impact than ever before, equal access to knowledge by the population is vital;
3. information accessibility should not be a new form of social inequality;
4. closing the growing gap between developed and developing countries must be a top political priority – no one can be left behind;
5. as knowledge cannot be understood without culture, research on the interface between vernacular and scientific knowledge must be developed;
6. access to knowledge should be considered as a right and should be protected from short-term industrial interests limiting this access;
7. there must be a continuous dialogue between society and science, thus promoting scientific literacy and enhancing the advising role of science and scholarship;

8. scientific discourse should stop being gender-blind, barriers that prevent more women from choosing science careers and reaching top positions should be overcome;
9. the young generation's interest in science and commitment to the knowledge-led future of their countries should be stimulated by introducing innovative teaching methods, and by changing the image of the scientist, with the help of media and through involved mentorship.

As the time passes, many industrialized countries are becoming knowledge-based societies, such as: the USA, Japan, Germany, France, and England. In the First Tier countries and territories, Hong Kong, the Republic of Korea, Singapore, and Taiwan (Pr. China), access to ICTs is rapidly converging to levels that have been attained in the industrialized world and these countries are actively engaging in the knowledge-based development process. The Second Tier countries (Indonesia, Malaysia and Thailand) are "catching up" reasonably quickly.

Knowledge is essential to the modern society and social coexistence. We can classify knowledge into professional knowledge or scientific knowledge, and general knowledge with the concept opposed to professional knowledge. Professional knowledge varies somewhat in its importance and need according to the development trend in each field of science. In today's society people depend upon general knowledge, which exhibits three specific characteristics (Korea Ministry of Education 1999; Kwon, Won-Ki, 2001): (1) general knowledge forms the foundation for daily communication, thus providing the essential component for social activities; (2) knowledge provides an essential qualification as well as the starting point for one to discuss with professionals and have their voice heard among them, thus giving possibility to access professional knowledge; (3) general knowledge helps us to explore the criteria for evaluating the development of individuals, thus serving as a compass for learners to navigate the sea of structured information – which is equal to knowledge. An individual in the knowledge-based society should have a practical knowledge and on-the-scene experience, on top of firm basic abilities and abundant general knowledge.

Generally speaking, once knowledge has been created it needs to be properly disseminated and used, if it is to create more value. A precondition for the free flow of knowledge is that intellectual property rights must be protected. At the same time, a suitable environment needs to be created, and mechanisms established to encourage knowledge flow. This means that on the one hand, the government must provide protection for intellectual property rights, whilst at the same time using collaboration between industry and academia, incubator centres and research foundations to ensure the diffusion of knowledge and technology through industry.

The next important aspect is knowledge management (L. Petrides, T. Nodine, 2003), which includes: the creation, recording, organization, acquisition and use of knowledge, and for enterprises, implementing effective knowledge management is the key to upgrading their competitiveness. From the point of view of the government, the promotion of knowledge management means establishing an environment which will facilitate the creation, flow and diffusion of knowledge, thereby stimulating the growth of knowledge-type industries.

The Delphi survey reports in Germany said that the fields in which knowledge is forecast to continue to develop within 25 years to come were categorized into six groups: (1) information technologies and media, (2) new technologies, (3) medicine, genetics and human body, (4) ecology and environmental engineering, (5) international economy and the world of work, (6) social changes and knowledge management. In all the above-mentioned categories sociology, psychology and education play an main role.

The World Science Forum in Budapest (2003) characterized also the ethical dimension of the knowledge-based society:

1. Knowledge and society form a partnership: science needs to work in harmony with and for society; science and scientific knowledge must remain "human" regarding community and environment, including moral responsibility and safeguarding humanity's cultural and linguistic heritage as well as diversity in creativity.
2. The call is for global ethics in the pluralistic society, to enable the individual to exist in a local/regional as well as in a national community at the same time; inclusive of using his/her vernacular, national, and international language.
3. It is also an ethical dimension of research to concern ourselves with the rights of and obligations towards other living beings in the biosphere.

According to Kwon Won-Ki (2001) we can discuss five main variables/factors driving them towards the knowledge-based society.

The first is the advancement of globalization represented by the expansion of the world markets, by an increase of subsequent human and material exchange, and by development of information and communication as well as transportation technologies. These globalization phenomena are serving as the dynamo for creating knowledge, and the ability to create, share, and utilize knowledge are one of the most important variables in international competitive edge in the process of globalization.

The second is the advancement of information. The acquisition level of information is a tool by which one can measure the levels of productivity and cultures for individuals and organizations. Technologies and information are increasingly

designed to produce, process and transfer information – in this way changing its value.

The third is a change in the form, opportunities and contents of work. Therefore, knowledge in specific and narrow fields is losing its value gradually as the time passes, and should be continued and replaced by new knowledge and experience. Because of that future jobs will require abilities such as: creativity, intuition, and social responsibility, as well as they will pose doubts to regulations that have spurred personalization and have been successful.

The fourth is a change in the knowledge-handling systems and their intensity – they are new in modern society. Knowledge is used in solving not only research but also our daily problems, since knowledge practically plays a more and more important role in our life.

The fifth is the explosive increase of knowledge. In futuristic prognoses the knowledge-based society will have been into full-swing stage by 2006, knowledge will have doubled every 73 days by 2020, and people will have used 1% of current knowledge by 2050.

Education in the knowledge-based society

The knowledge-based society cannot exist without highly educated citizens and well-trained workforce. Education and training are therefore crucial to achieving the ambitious economic and social goals Europe has set itself for 2010.

Major transformations are occurring in the formal education sector and other organizations that play a key role in enabling people to develop new capabilities. The educational system is challenged to boost its performance to levels never witnessed before. We therefore must further extend the powerful existing open and distance learning model for mass education to more flexible and personalized modes. This can be facilitated by the use of ICT and a well-chosen mix of media, ranging from printed material, AV components and (digital) television as mass media to tutoring elements, ICT supported components and (broadband) internet as individualized media (cf. S. Juszczyk, 2003). One can say that social cohesion and the competitiveness of Europe depend more and more on our ability to exploit the potential of ICTs for learning. The main benefits of ICT when applied to learning include facility of access, flexibility, learner orientation and better opportunities for collaboration. The feasibility of interactive learning (between teachers and learners, between computer-based software applications and learners, and among teachers and learners themselves) is becoming a reality for some people in developing countries. In the contemporary education the main role is played by conferences

and small discussion groups around computers, surfing the Internet, and the most problems, whether scientific or corporate, are addressed by teams. Students prepare papers collectively and they can log onto networks to confer with other students located in foreign countries.

Creating a digitally literate Europe, supported by an entrepreneurial culture, was one of the key objectives of the e-Europe initiative of 2000. The e-Europe 2005 Action Plan (cf. Culture in the digital era – http://europa.eu.int/information_society/soccul/cult/index_en.htm) recognizing the importance of cultural heritage in education and learning policies, purposes in particular that all European museums, libraries, archives and similar institutions should be connected to broadband networks by the end of 2005, making accessible to everyone, everywhere at any time. The EU is playing a leading role in forecasting its cultural heritage and promoting the cultural industry. A new programme Media 2007 symbolizes the EU's strong commitment to the audiovisual sector, which has a major role in the construction of a shared European identity. To enhance trans-national mobility and circulation of works of art, as well as interactive networks in the knowledge-based society it is necessary to overcome such barriers as languages, multiple standards, cultural differences and different administrative traditions. To help overcome these barriers to the cross-border use of digital content, the EU has implemented further specific programmes.

The development of new multimedia technologies and the growth of the Internet in recent years have given Europeans access to an incredible range of information and resources. Successfully exploiting this potential for improving education and training depends far more on pedagogical and organizational issues than on the technological ones themselves. But introduction of ICTs to education should be accompanied by a ground reorganization of learning structures along to the modernized constructivist as well as cognitivistic theories (cf. S. Juszczyk, 2003). ICTs are superseded by the human brain not only in one sense – in terms of intelligence or creativity. The speciality of human information processing (which through pattern-recognition leads to perception) is being toppled by innovations in relation to automatic visual-scanning, voice keys and speech recognition.

Bengt-Äke Lundval said in 1992, that the most fundamental resource in the modern economy is knowledge and, accordingly, … the most important process (of economic development) is learning … learning is predominantly an interactive and, therefore, a socially embodied process which cannot be understood without taking into consideration its institutional and cultural context. "Learning" takes place during routine activities associated with producing, distributing, and consuming ICTs and services. For example, the every dayexperiences of workers, production engineers and sales representatives influence the agenda determining

the direction of innovative efforts, and they produce knowledge and insights forming crucial inputs to the process of innovation (B-A. Lundvall 1992, p. 9).

Learning is not something that only people in firms do. Learning is also important for public and private sector organizations and institutions. Learning is as important for effective policy-making as it is for the competitiveness of firms or the effectiveness of local community groups. It is both a formal and an informal process and the outcomes of policy-making and the management if ICT innovations are designed and articulated not just in the formal "corridors of power" but in the everyday interventions and experiences of ICT producers and users (Silverstone & Mansell, 1996, p. 225).

In a world where knowledge and information are basic paradigms individuals need new skills to adapt to rapidly changing life and work environments and to be able to fully participate in society. In the modern society people should have the following job abilities (Kwon, Won-ki, 2001, 7A-2): the ability to understand multinational cultures, the psychological-social ability, the ability to command foreign languages; the ability to perform technical and methodological learning, the ability to utilize the media, the ability related to specific fields and others. Education plays an important role in shaping the abilities.

Among the above-mentioned abilities we can recognize two building skills for the knowledge-based society: digital literacy and media literacy (S. Juszczyk, 2004), strongly connected with knowledge. Digital literacy is becoming an essential life skill. Inability to access or use ICT effectively is becoming a barrier to social integration and personal development. The role of education is to avoid a "digital divide" between those with access to ICT and the knowledge and skills to take advantage of them, and those without. Since in many countries people have the opportunity to develop the skills necessary in the new type of society in the framework of the e-inclusive plans (the ICTs have a great potential to overcome the traditional form of exclusion and functioning of the people in the educational niches), which often include eLearning programmes (S. Juszczyk, 2006). eInclusion is a multidimensional challenge and the digital divide is a wide issue also affecting countries/regions and organizations/businesses as such, but this also has usually cumulative consequences for people, in particular those most sensitive to exclusion. According to the Lisbon strategy in 2000 in the EU countries in order to empower people with disabilities and to facilitate their access to employment and integration to society the European Disability Strategy has been accepted and its Action Plan Equal Opportunities for People with Disabilities (generally we call them e-Accessibility programmes). The eEurope Action Plan 2005 focuses on ensuring equal participation of all citizens in the mainstream development of modern online public services, like: eGoverment, eLearning, eHealth and in

creating a dynamic and accessible eBusiness environment. The eInclusion action line specifically addresses this horizontal issue. – see http://europa.eu.int/information_society/soccul/eincl/index_en.html. A similar problem concerns elderly people. There appear the questions: Are elderly people getting involved or being left behind in the knowledge-based society? Does this really matter for them or for society overall? How might things evolve without any policy intervention? What policy interventions might be warranted to achieve desired outcomes? A number of specific factors that pose barriers to and constraints on the engagement of elderly people with ICT and the Knowledge-based society one can find on the web site: The Demographic Change – Impact on new Technologies and information Society http://ec.europa.eu/employment_social/social_situation/docs/lot7_ict_summary.en.pdf.

Media literacy is the ability to access, analyze and evaluate the power images, words and sounds that confront us in our daily lives as well as to communicate fluently in all and new media.

We need to cultivate the basic abilities at elementary school and junior high school, and general knowledge at secondary school and the initial stage of higher education. At higher education steps and a variety of educational institutions in society there is a need to cultivate professional knowledge, practical knowledge, on-the-scene experience-based knowledge, and especially abilities to solve problems and creativity. We need to make efforts to achieve these objectives through the improvement of curriculums or reforming of the educational methods. We should transfer the subjects of operating the educational systems including general education to the local governments and communities.

We should cultivate curriculums that meet the requirements needed for the 21st century and students' abilities to learn, and ensure quality education when students leave school. We need to substantially formulate curriculums, so as to improve the students' abilities for basic sciences, computer and foreign languages that fit knowledge-based society in this era, as well as to equip them with creativity and interpersonal relationship abilities. Many sociologists say that INfrastructure, EXperience, Skills and Knowledge (INEXSK) are the main variables/factors that may contribute to the knowledge-based economy – cf. R. Mansell, U. Wehn, 1998, p. 21–23.

At present our goal is to build a learning society by teaching individuals how to avail themselves of self-education, as an important step to the knowledge-based society. In the knowledge-based society learning is treated mainly as a lifelong activity, which can be defined as "all learning activity undertaken through life, with the aim of improving knowledge, skill and competence, with a personal, civic, social and/or employment-related perspective" – cf. EUROPA – Education and Training

– Lifelong Learning (http://ec.europa.eu/education/policies/III/life/what_islll_en.html). Lifelong learning is therefore about:

- Acquiring and updating all kinds of abilities, interests, knowledge and qualifications from the pre-school years to post-retirement. It promotes the development of knowledge and competences that will enable each citizen to adapt to the knowledge-based society and actively participate in all spheres of social and economic life, taking more control of his or her future.
- Valuing all forms of learning, including: formal learning, such as a degree course followed at university; non-formal learning, such as vocational skills acquired in the workplace; and informal learning, such as inter-generational learning, for example where parents learn to use ICT through their children, or learning how to play an instrument together with friends.

The introduction of lifelong learning strategies requires that the foundations of learning be strengthened and changed. It also implies that there must be flexibility for movement between education, training, and work, and new rules for public and private sector institutions that contribute to the learning process. The more flexible learning environments are the result of application of ICTs (Rutanen, 1996). Some aspects of the learning experience in both conventional and virtual learning environments are likely to continue to need to be supported by face-to-face activities if they are to be successful.

Lifelong learning has therefore been a core EU policy since 2001, when the EU Member States agreed, in an EU Council Resolution on eLearning, to act together to enable easier integration of ICT into education and training system. The EU Member States should adapt their formal education and training systems to the demands of the modern environment, breaking down barriers between different forms of learning and giving all EU citizens the chance to develop the ICT skills. In order to promote the effective use of ICT in education and training the European Commission proposed two key programmes in these fields, namely Socrates and Leonardo da Vinci. Socrates has a specific line, Minerva is specifically dedicated to open and distance learning, and the educational use of ICT. The Leonardo da Vinci vocational training programme has been innovation-led from the outset and supports many projects that make extensive use of ICT for training purposes – see: http://europa.eu.int/information_society/edutra/inno/index_en.htm.

One of the implications of lifelong learning is that individuals will increasingly be required to accept responsibility for their own training and for keeping up-to-date. It is now apparent that up-skilling and re-skilling will become a reality for today's and tomorrow's workers. In order to meet these requirements, adult learners will demand access to cost-efficient, up-to-date and readily accessible learning

programmes. Often, many of them are carried out in the form of eLearning[2] as well as distance education programmes with the use of the ICT (S. Juszczyk, 2003). Technological innovation is developed to serve education in highly diverse learning contexts, with respect to linguistic, cultural and social differences.

On the other hand, traditional classrooms with teacher-led activities still predominate but how can this cottage industry approach to learning services be sustained? Some of the big educational institutions that are also educational publishers have a division of labour professional approach. In many places the teacher still attempts to do a whole range of activities, from administrator to counselor to teacher to instructional and web designer. Schools are extremely important for socialization and communication and one of the major needs of the future workplace are communication skills. This type of skills one can shape with the help of ICT. Not only in work but also in social and political life, communication and socialization are extremely important. Schools have a major role in social cohesion and in national culture (C. Freeman and L. Soete, 1994, p. 157).

Mass-individualization of higher education for the knowledge-based society was the topic of the 2004 the European Association of Distance Teaching Universities (EADTU)[3], that took place on October 21-23, 2004 in Heerlen (Open Universiteit Nederland). The conference topic drew its inspiration from both the Bologna Declaration and the Lisbon Strategy. The conclusions as a result of discussion were presented at the web site: www.eadtu.nl in order to inform policy makers and all those involved in creating a European Learning Space. I would like to present a few of them:

– The flexibilization of learning tracks goes beyond the Bologna two cycle bachelor-master structure in terms of access(ibility), diversification and personalization. The accessibility to higher education must increase drastically. Students of all ages should be easily connected online from home and from the workplace. As a component to regular education, Lifelong Open and Flexible (LOF) higher education must be organized in order to facilitate access and participation of all ages in higher education, taking into account the diversity in student needs and profiles. Diversification includes shorter courses for specific target groups. Only the integration of new technologies and new

[2] eLearning – learning enhanced by the use of the Internet and new multimedia technologies – should be available for all.

[3] EADTU is the representative organization of both the European open and distance learning universities and the national consortia of higher education institutions active in the field of distance education and e-learning, in total 20 national members from 19 countries serving over 900,000 students. Therefore, it is the main voice of the community for open and distance higher education and e-learning in Europe.

services, allowing for new kinds of learning content management, services to students, interactivity with staff and between peer students, can make education more flexible and adapted to the personal needs of students. As a result, learning tracks can be more personalized for learners of all ages, which can become manifest in so-called personal portfolios.

– The physical and virtual mobility, supported by the EU subsidy and grant programmes. Physical mobility contributes to the personal development of students, the acquisition of a foreign language and intercultural skills. Virtual mobility will enable students to study at any university, at any moment, at any place, and it creates the possibility of: building learning communities at whatever scale (national, European, worldwide), integrating staff and services from different universities that offer a joint course, seminar, project or programme, if necessary combined with face-to-face sessions.
– The European Learning Space (ELS) should be spanned through collaboration and alliances among European universities, which may participate in multiple networks to serve different purposes, for example, in an international framework or in a regional context. Thus, universities will be nodes in multiple networks in the European Learning Space and such a situation can stimulate and integrate national and institutional policies into a coherent and operational ELS.
– Adequate implementation of lifelong learning in higher education depends on a major joint effort of three stakeholders: universities, the corporate sector and the government, which requires a new arrangement of collaboration. New collaborative arrangements are needed to suit the European context, to match the ambitions of universities regarding lifelong learning, and to improve the accessibility of higher education to learners.

According to P. Crisp & G. Webeck (2003) collaboration is an imperative for contemporary education and it was found to mean different things to different people, ranging across informal activities through working relationships and into formal collaboration – developing mandatory standards and joint ventures. Collaboration is a preferred strategy to: (1) pool financial and human resources for investment; (2) address national policies and regulations; (3) find solutions to problems or challenges that are owned nationally; (4) assist in being more competitive internationally.

In the opinion of C. Fripp, J. Blakeley & D. Macnamara (2003) collaboration and sharing are also becoming part of the broader issue about exploitation of materials through both formal and informal mechanisms. Collaboration in the product development context is a theme which is inextricably linked to that of the "re-use" or "re-working" of learning materials. To collaborate and share, then, requires some

new thinking about how we structure information and resources in internal repositories, the use of metadata, and how rights management is addressed.

Increasingly, educational institutions are realizing the need to integrate "e-administration" with "e-learning" to produce "e-education". The forms of integration will vary from institution to institution, but there is no doubt that efficiencies can be achieved through using ICT to provide increased levels of student self-service as well as to improve the range of learning models on offer. ICTs also offer opportunities for collaboration between practitioners and indeed provide a format for that collaboration. Also in business it is possible to compete and cooperate - competition does not always mean you cannot collaborate on some specifics. It is possible to collaborate through "trading" of learning resources although it is necessary to define exactly where one's competitive edge is vested. Many still believe their competitive edge is in the learning resources used in delivery of educational services.

The scientists agree (see http://64.233.183.104/search?q=cache…), that in order to improve enterprises' ability to innovate, the government should make adjustments to the education system, for example by placing more emphasis on the ability to think and develop ideas in curriculum design, so as to cultivate talented people with the ability to innovate. The universities need to be transformed from places where one studies only once in a lifetime, to places to which people can return repeatedly for further education whilst they are in employment, providing people within industry with an opportunity to refresh their knowledge. In addition, incubator centres can be used to encourage university professors to commercialize their knowledge and create profits from it, thereby making academic manpower available to support industry.

Governments can contribute to learning processes by guiding or controlling the rate and direction of technical and economic change by identifying and filling important gaps in the institutional framework in which learning occurs.

Conclusions

There are opportunities for all countries in the coming years to make the best use of the potential offered by ICTs to support their leading development goals. This applies to the goals of improving the quality of life and environmental sustainability of industrialized countries. It also applies to the goals of alleviating poverty and contributing to sustainable development in the least developed and developing countries. Exploiting these opportunities also requires renewed commitment to learn from each others' failures as well as successes. Learning in the workplace, and

through collaborations that sometimes span the globe and at other times involve tightly knit local communities with similar interests, will become more common. Institutions of formal education, and especially higher education, will continue to play an important role.

I believe that the changes in the Polish society caused by technology are becoming increasingly apparent. As a result, people have started talking more openly about what kind of new type of society we want to live in and how; who can use the new services and who cannot; how to maintain competitiveness; what are the worst threats and greatest opportunities of the knowledge-based society. In professional services we include: basic networks, enhanced voice and data networks, narrowcasting services, broadcast services, digitized content, software, computer equipment, broadcast network equipment as well as electronic measuring and scientific instruments.

Poland has increasingly invested in the education system. Everybody in Poland receives primary (basic schools) and secondary education, and about 75–80 per cent go on to the tertiary education system. About 25 per cent of higher education institution leavers follow three steps of higher education: in the first step we have the vocational three-year studies (with the exclusion of studies of: law, psychology, and medicine), in the second step we have two-year studies that finish with obtaining a master's degree, and in the third step we have doctoral studies. The ICTs are a pillar of a modern education and a knowledge-based economy. Structural changes in the Polish economy show the increasing importance of the production, diffusion and use of knowledge and information for improving the competitiveness of firms and overall economic performance. The Internet is the key driver of ICT, with more and more households and companies connecting up and using it. The Internet related technologies enable the development and rapid growth of electronic commerce, which is a driving force to much larger socioeconomic changes in our society. The role of the public sector is to create conditions for building the knowledge-based society which meets the needs of both individuals and business enterprises by means of legislation, research and education.

Polish children who have been through the education system are able to use computers to access, select, assess, and apply information. They also develop the skills and motivation for lifelong learning so that they can continue to be employable as jobs demand new skills and abilities.

The digital economy has potential, but it also has risks and bottlenecks. From our point of view, the greatest risk relates to the different kinds of competence mentioned in the article. Our challenge is to stay at the cutting edge of rapid technological development and to exploit ICT in all sectors. At the same time, we should involve all levels of society and open all types of education (especially

lifelong learning connected with self-education) for the needs of all our citizens. Training and support for teachers who provide the education and training is a prerequisite. Schools can change attitudes to learning, other people, oneself, and technology. With careful supervision, contracts of conduct and acceptable use policies, location of computers in public places such as resource areas and libraries, most worries about unwanted content on the Internet can be allayed.

In conclusion I would like to cite the words of Bastos (1998): "Preparing the young and re-adapting the adult population with quality knowledge and skills for a fulfilling and productive life in this new reality, and offering the young and the adults the opportunities for continuous learning are the biggest challenges to be faced by education systems all over the world."

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